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GB A 2015433

(58) Field of search
B6F

(54) Thermal printer

(57) A thermal printer comprises a carriage (5), a platen (1) disposed in confronting relation to the carriage (5) for winding a sheet of print paper thereon, a thermal head (4) mounted on the carriage (5) for printing on the sheet of print paper against the platen (1), a first means for moving the carriage (5) along the platen (1), a second means for feeding the sheet of print paper, a single motor (23) and a gear assembly driven by the single motor (23) for operating the first and second means, the gear assembly having a detector for detecting a reference position of the carriage (5).

Fig.1

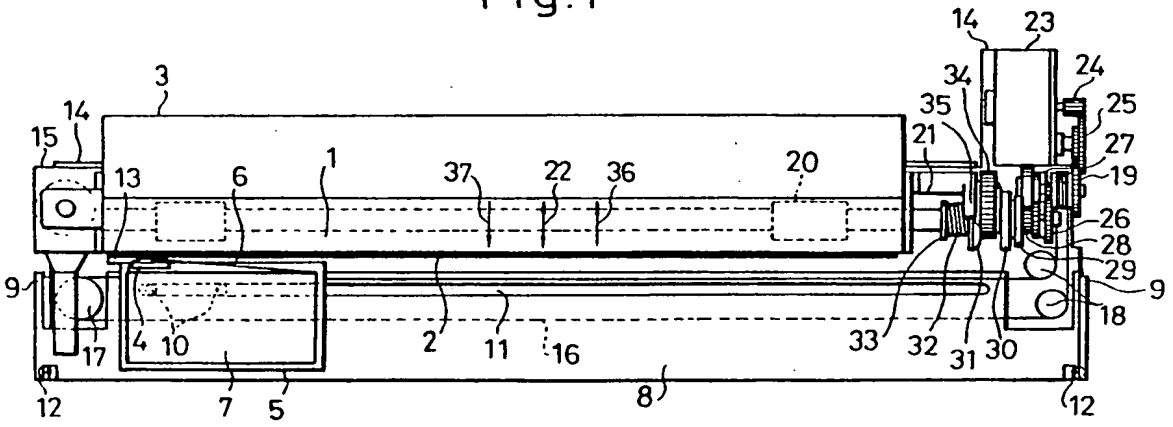

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Fig.1

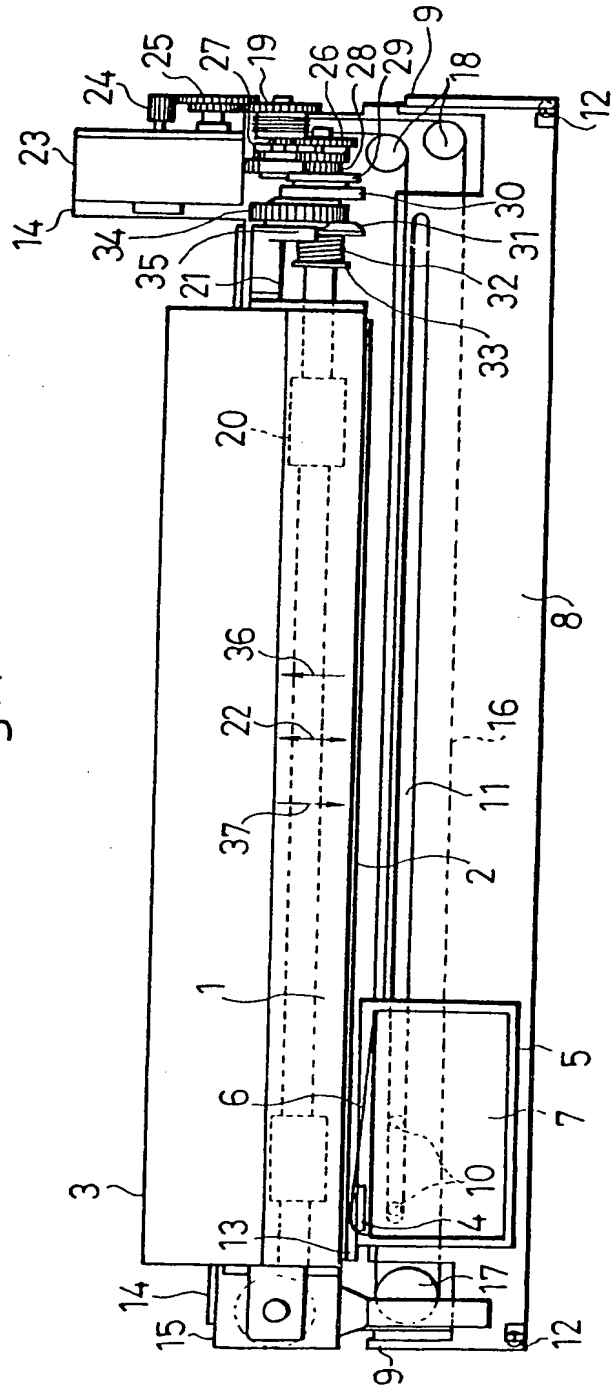

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Fig. 2(a)

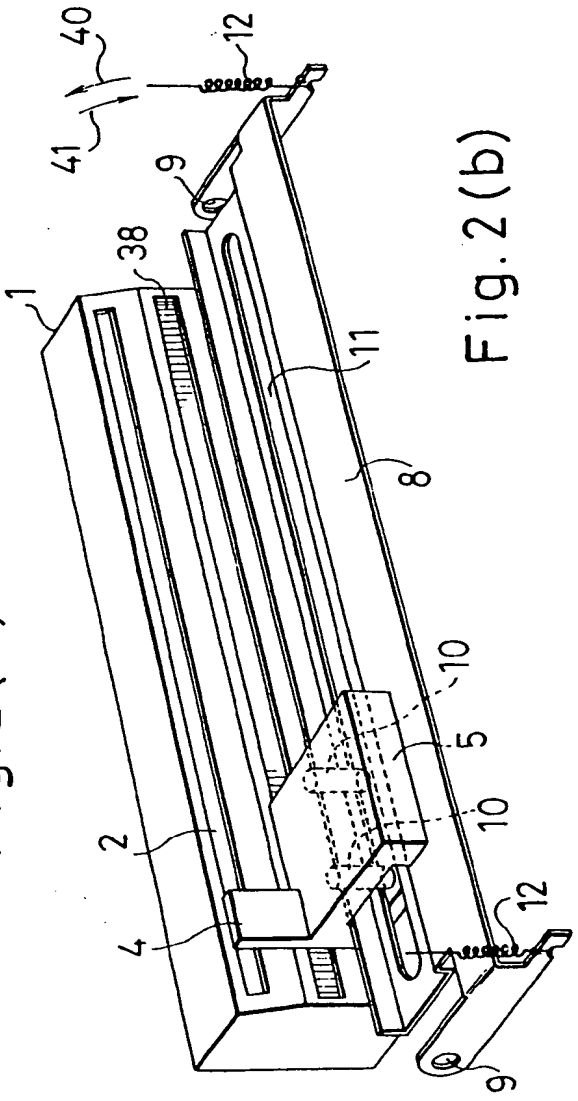

Fig. 2(b)

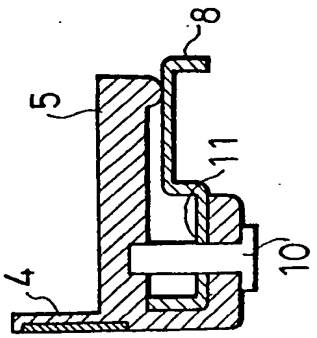

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Fig.3(a)

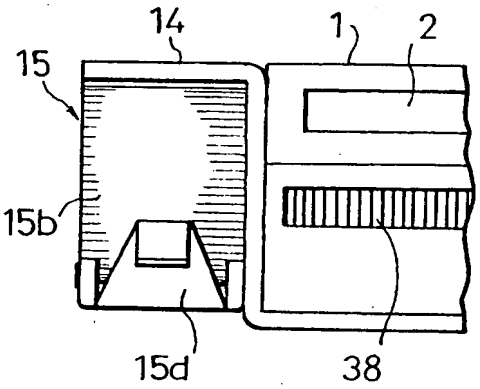

Fig.3(b)

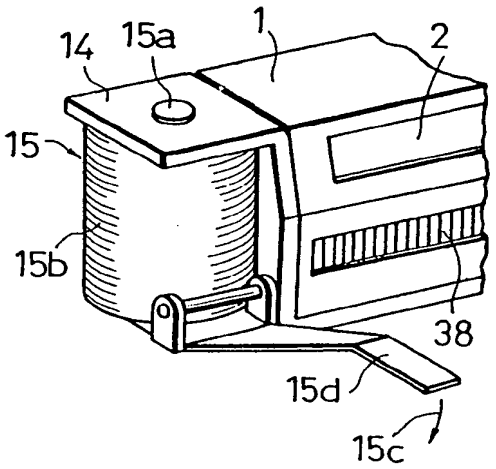

Fig.4(a)

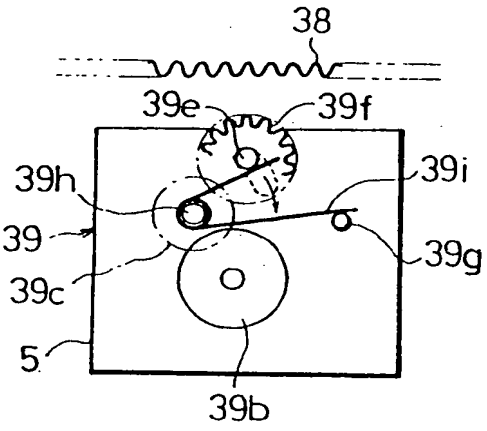

Fig.4(b)

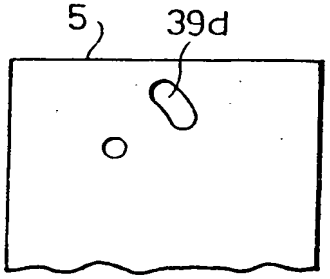

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Fig.5(a)

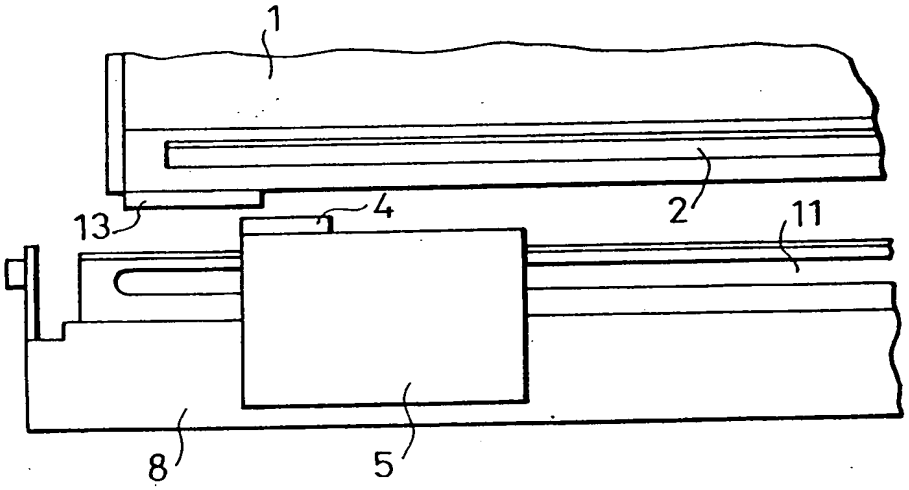
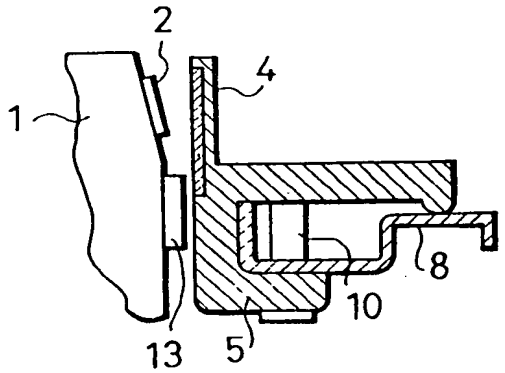


Fig.5(b)



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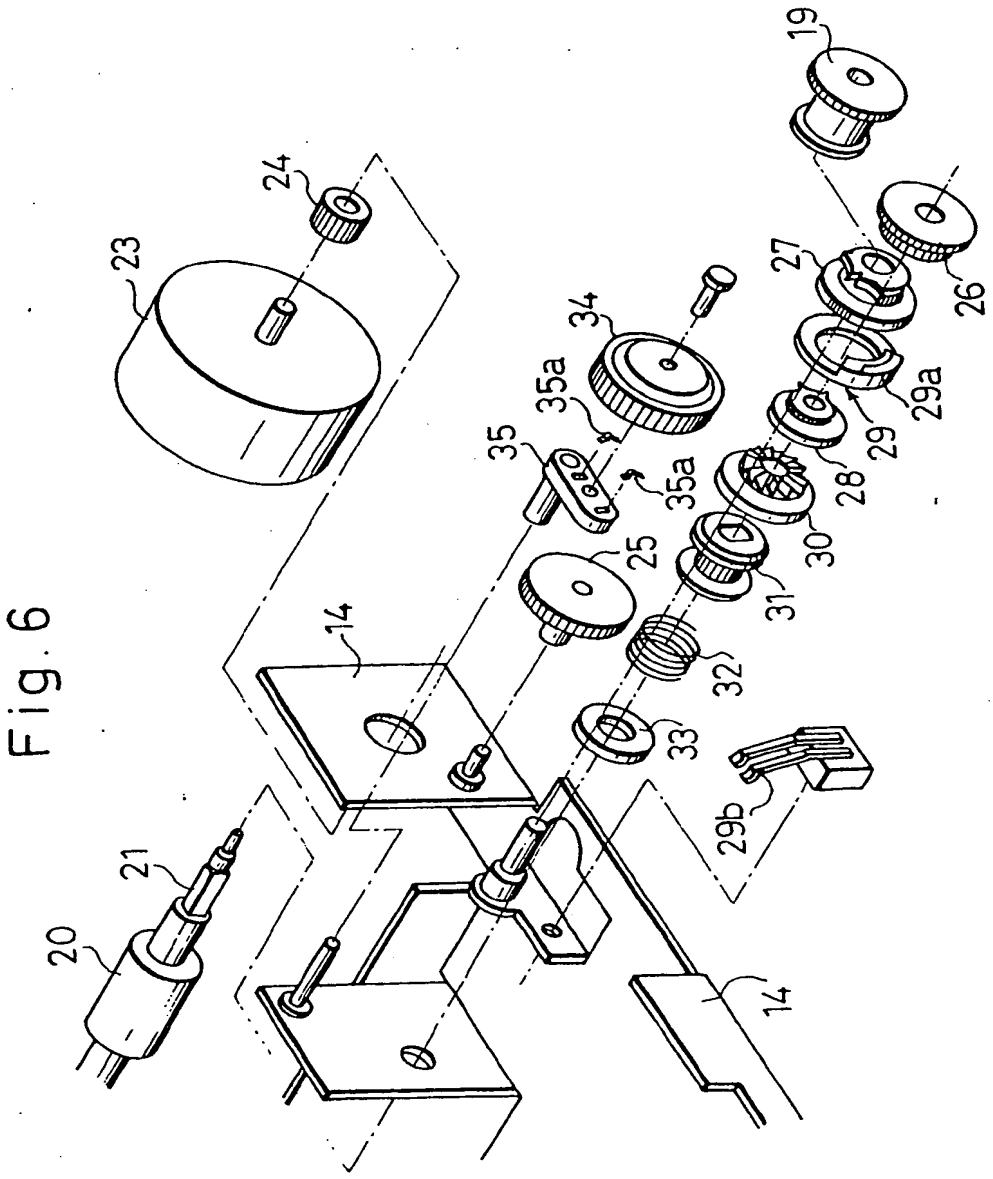

Fig.6

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Fig.7(a)

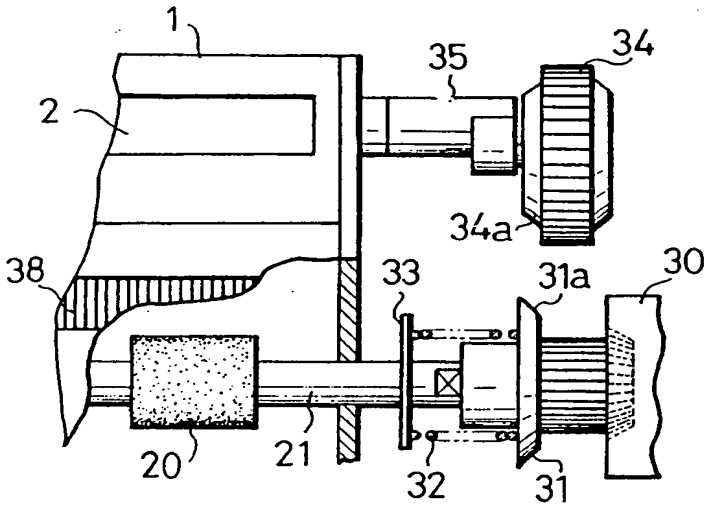

Fig.7(b)

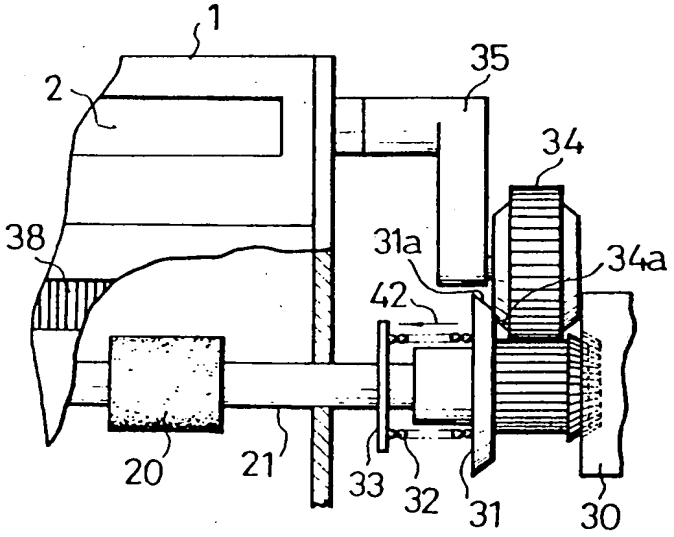

Fig.7(c)

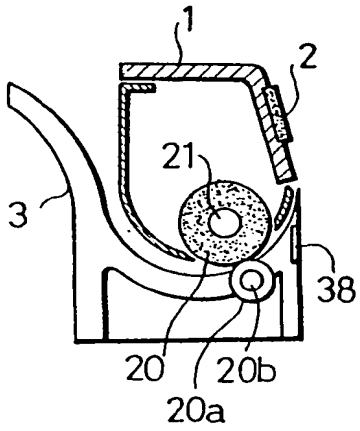

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Fig.8(a)

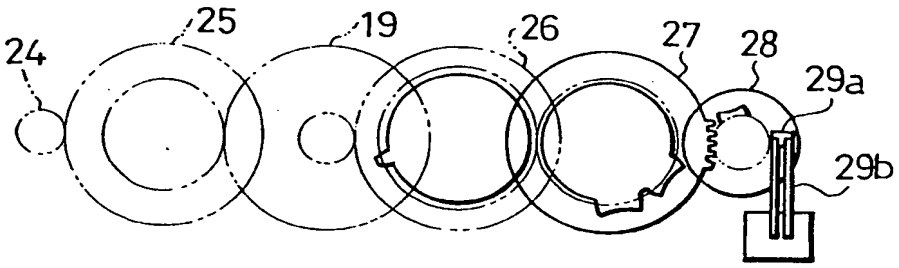

Fig.8(b)

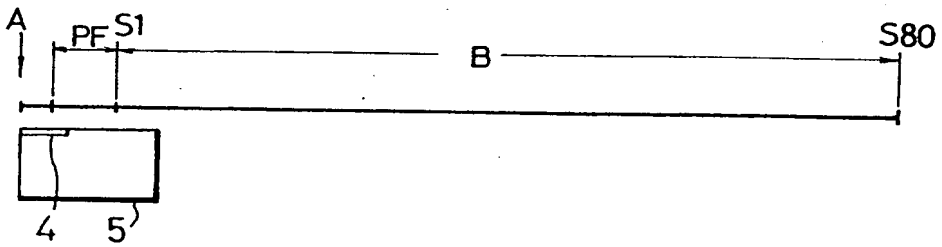

Fig.8(c)

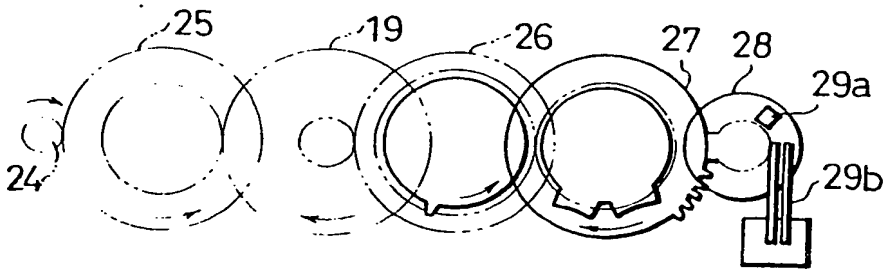

Fig.8(d)

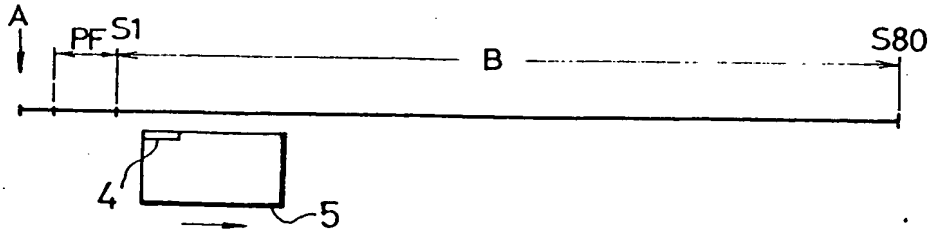

Fig. 8(e)

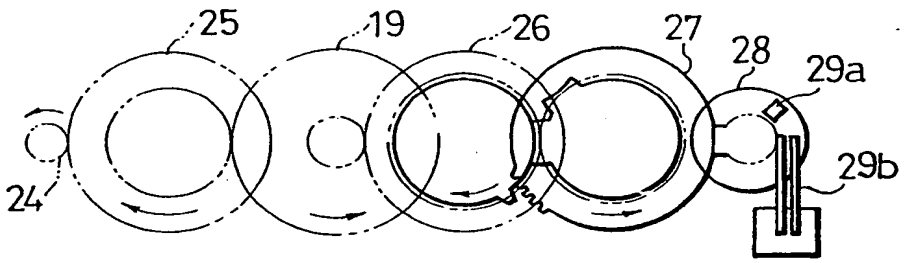

Fig. 8(f)

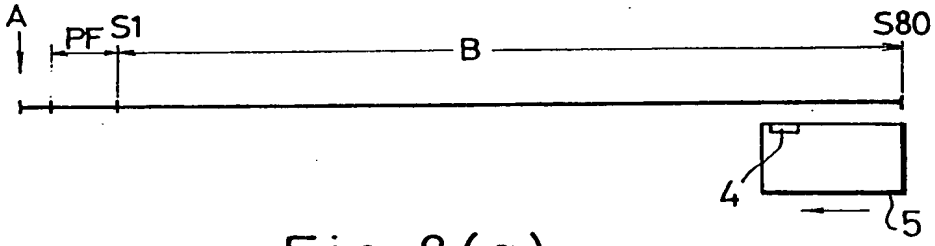

Fig. 8(g)

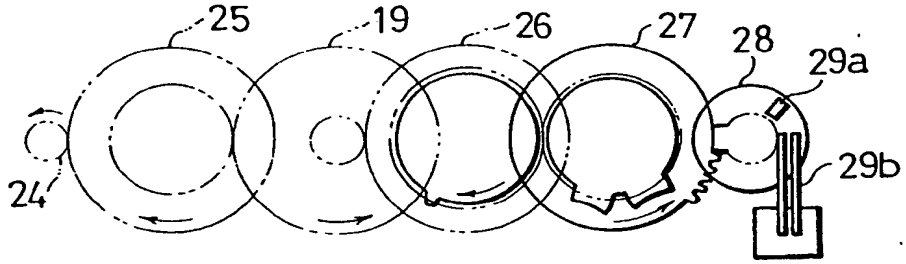

Fig. 8(h)

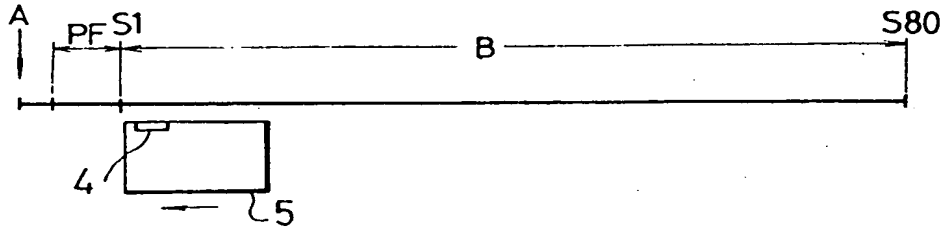

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Fig.8(i)

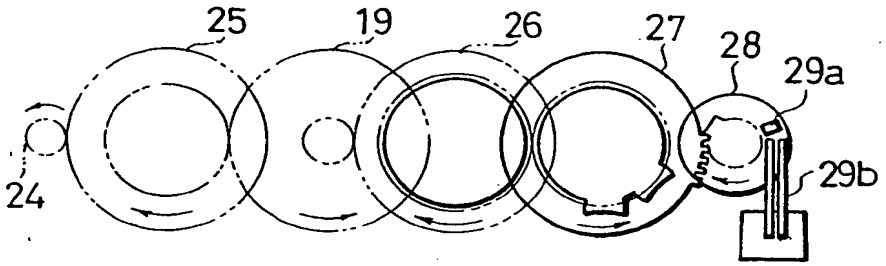

Fig.8(j)

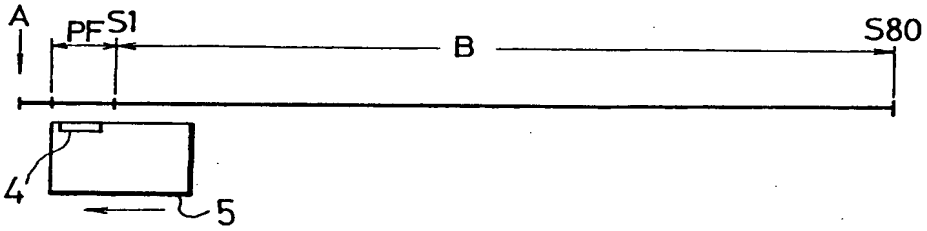

Fig.9(a)

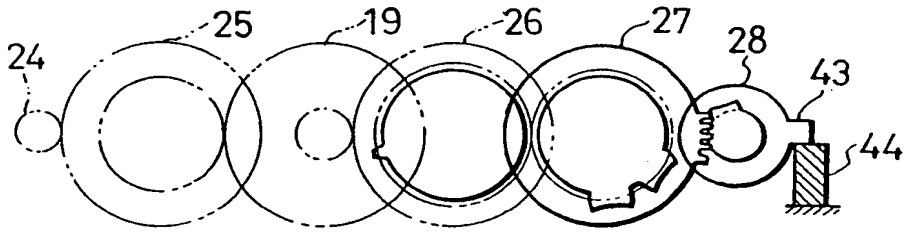

Fig.9(b)

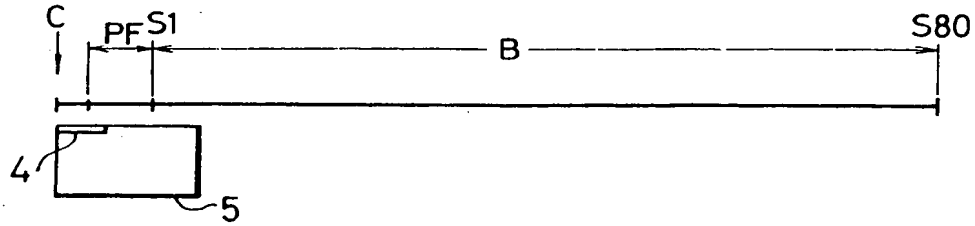

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Fig.10(a)

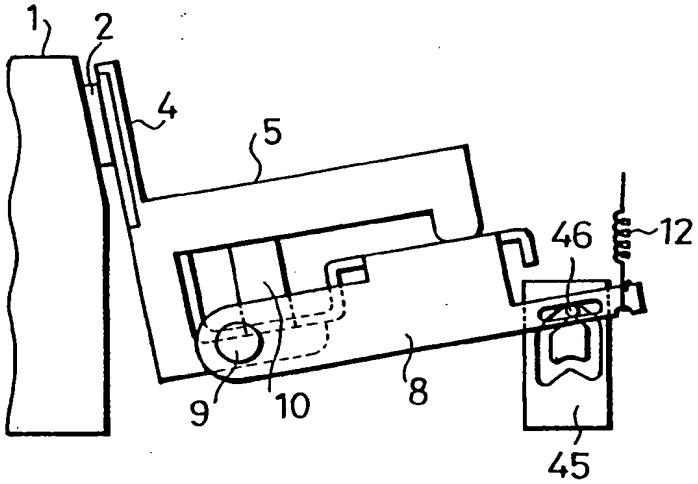
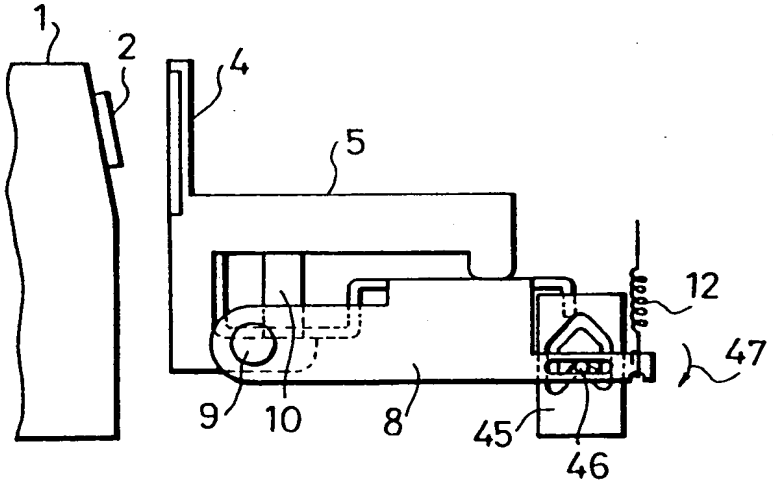


Fig.10(b)



SPECIFICATION

Thermal printer

The present invention relates to a thermal printer, and more particularly to a thermal printer which can be manufactured less costly.

In a conventional thermal printer, a print tape having a thermally fusible material is disposed between a sheet of print paper and a thermal head, and a plurality of heating elements on the thermal head are selectively heated as the thermal head moves to fuse the thermally fusible material of the print tape and transfer the fused material to the print paper. The thermal printer is advantageous in that it produces no noise during printing operation, and there is no limitation on the types of sheets of print paper used.

However, the prior thermal printer has a motor for driving a carriage moving means for moving a carriage on which the thermal head is mounted, and another motor for driving a print paper feed means for feeding the print paper. With the two motors employed, the thermal printer is costly to manufacture.

With the conventional drawback in view, it is an object of the present invention to provide a thermal printer having a single motor for driving a carriage moving means and a print paper feed means.

According to the present invention, there is provided a thermal printer comprising a carriage, a platen disposed in confronting relation to the carriage for winding a sheet of print paper thereon, a thermal head mounted on the carriage for printing on the sheet of print paper against the platen, a first means for moving the carriage along the platen, a second means for feeding the sheet of print paper, a single motor, and a gear assembly driven by the single motor for operating the first and second means, the gear assembly having a detector for detecting a reference position of the carriage.

A thermal printer embodying the invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings in which:

Figure 1 is a plan view of a thermal printer according to the present invention;

Figure 2(a) is a perspective view of a carriage guide mechanism in the thermal printer shown in Figure 1;

Figure 2(b) is a transverse cross-sectional view of the carriage guide mechanism;

Figure 3(a) is a front elevational view of a solenoid attachment construction in the thermal printer;

Figure 3(b) is a perspective view of the solenoid attachment construction;

Figure 4(a) is a plan view of s print tape takeup device in the thermal printer;

Figure 4(b) is a plan view of a carriage as part of the print tape takeup device;

Figure 5(a) is a fragmentary plan view of a mechanism for stopping pressing movement of a thermal head in the thermal printer;

Figure 5(b) is a transverse cross-sectional view of the mechanism;

Figure 6 is an exploded perspective view of a gear assembly and a detector for detecting a carriage reference position in the thermal printer;

Figure 7(a) is a fragmentary plan view of a manual paper feed mechanism in the thermal printer, showing a manual knob and a ratchet positioned out of mutual engagement;

Figure 7(b) is a fragmentary plan view of the manual paper feed mechanism, showing the manual knob and the carriage in mutual engagement;

Figure 7(c) is a transverse cross-sectional view of the manual paper feed mechanism, illustrating a paper feed roller;

Figures 8(a), (c), (e), (g) and (i) are views showing the relationship between carriage movement and paper feed operation and showing the meshing engagement between gears in the gear assembly;

Figures 8(b), (d), (f), (h) and (j) are illustrative of carriage positions corresponding respectively to the gear meshing relationships shown in Figures 8(a), (c), (e), (g) and (i);

Figure 9(a) is a view of a detector according to another embodiment for detecting a carriage reference position, showing a manner of meshing engagement between gears of the gear assembly;

Figure 9(b) is a diagram showing a carriage position corresponding to the gear meshing relationship illustrated in Figure 9(a);

Figure 10(a) is a side elevational view of another mechanism for stopping pressing movement of a thermal head, and showing the position in which a thermal head is pressed against a platen; and

Figure 10(b) is a side elevational view of the mechanism of Figure 10(a), illustrative of the manner in which the thermal head is not pressed against the platen.

As shown in Figure 1, a thermal printer according to the present invention comprises a platen 1 on which a sheet of print paper (not shown) is wound, a platen rubber sheet 2 mounted on a front position or print position of the platen 1 and a paper guide 3 for guiding the print paper wound on the platen 1. A thermal head 4 is disposed in confronting relation to the platen rubber sheet 2 and has a plurality of heating elements, the thermal head 4 being mounted on a carriage 5. A print tape 6, which has a thermally fusible material to be transferred to the print paper, is accommodated in a tape cassette 7 detachably mounted on the carriage 5.

The carriage 5 is movably mounted on a carriage guide plate 8. As shown in Figure 2(a), the carriage guide plate 8 is angularly movable about supports 9 having an axis

parallel to the platen 1. As shown in Figures 2(a) and 2(b), the carriage guide plate 8 has a groove 11 for guiding carriage guide shafts 10 fixed to the carriage 5; The carriage guide plates 8, the carriage guide shafts 10, and the groove 11 jointly constitute a carriage guide mechanism for guiding the carriage 5 along a front surface of the platen 1; The carriage 5 and hence the thermal head 4 on the carriage guide plate 8 are normally biased by a pair of springs 12 in a direction toward the platen rubber sheet 2; As shown in Figures 1, 5(a) and 5(b), a mechanism 13 such as a stopper, for stopping pressing movement of the carriage 5 and the thermal head 4, is mounted on one end of the front surface of the platen 1, that is, in a paper feed area, later described; In Figure 1, the thermal printer has a body constructed of a frame 14; A solenoid 15 is integrally mounted on the frame 14 for turning the carriage guide plate 8 against the biasing force of the springs 12; As shown in Figures 3(a) and 3(b), the solenoid 15 is composed of an iron core 15a mounted on the frame 14, a coil 15b surrounding the iron core 15a, and an actuator 15d angularly movable in the direction of the arrow 15c in Figure 3(b); The actuator 15d has a distal end engageable with the carriage guide plate 8; As shown in Figure 1, a wire 16 has ends coupled respectively to ends of the carriage 5 and is trained around pulleys 17, 18 mounted on the carriage guide plate 8; The wire 16 ia also trained around a drive pulley 19 which has gears on its opposite ends; The wire 16, the pulleys 17, 18; and the drive pulley 19 jointly serve as a carriage drive means for moving the carriage 5 along the platen 1; The print paper is held against paper feed rollers 20 supported on a paper feed shaft 21; The paper feed rollers 20 and the paper feed shaft 21, together with a roller 20a and a roller shaft 20b shown in Figure 7(c), constitute a print paper feed means for feeding the print paper in the direction of the arrow 22 in Figure 1. The print paper is sandwiched between the paper feed roller 20 and the roller 20a and fed along in response to rotation of the paper feed shaft 21.

As shown in Figures 2(a), 3(a), 3(b) and 4(a), a rack 38 is disposed below the front surface of the platen 1. As illustrated in Figure 4(a), a print tape takeup device 39 is disposed below the tape cassette 7 in confronting relation to the rack 38; The print tape takeup device 39 compriaes a base on the carriage 5, a gear 39b mounted on the carriage 5 for rotating a tape takeup spool (not shown) in the tape cassette 7, a gear 39c fixedly mounted on the carriage 5 and held in mesh with the gear 39b, a gear 39f having a shaft 39e loosely fitted in a slot 39d in the carriage 5 (Figure 4(b)) and capable of meaning engagement with the gear 39c, a pin 39g fixed to the carriage 5, and a spring 39i coiled around a rotatable shaft 39h of the gear 39c and having one end engaging the pin 39g and the other end engaging the shaft 39e of the gear 39f for normally biasing the gear 39f in a direction toward the rack 38. When the thermal head 4 is pressed against the platen 1, the gear 39f and the rack 38 are held in meshing engagement with each other. When the thermal head 4 is out of pressing engagement with the platen 1, the gear 39f disengages from the rack 38.

As shown in Figures 1 and 6, a stepping motor 23 has an output shaft on which there is mounted a motor gear 24 held in driving mesh with an idle gear 25 meshing with one of the gears of the drive pulley 19. A first intermittent gear 26 is held in mesh with the other gear of the drive pulley 19, and a second intermittent gear 27 is held in meah with the first intermittent gear 26. A paper feed gear 28 is held in mesh with the second intermittent gear 27. A movable contact 29a is mounted on a movable contact attachment base 29. As illustrated in Figures 7(a) and 7(b), a ratchet 30 is held in mesh with the paper feed gear 28. A ratchet 31 is engageable with and disengageable from the ratchet 30. The ratchet 31 is biased by a ratchet spring 32 in a direction to mesh with the ratchet 30, the ratchet spring 32 being supported at one end on a washer 33. The ratchet 31 can be moved in a direction away from the ratchet 30 by a manual knob 34 having on a periphery thereof a gear engageable with the gear on the ratchet 31. The manual knob 34 is angularly movably supported on a lever 35. The manual knob 34 has a tapered side portion 34a, and the ratchet 31 has a tapered portion 31a engageable with the tapered side portion 34a. As shown in Figure 6, detent springs 35a are attached to the lever 35. Recesses defined in a side of the manual knob 34 and the detent springs 35a jointly constitute a detent mechanism. A fixed contact 29b is mounted on the frame 14; for example, for engagement with the movable contact 29a mounted on the movable contact attachment base 29. The movable contact 29a and the fixed contact 29b serve as a detector for detecting a reference position of the carriage 5. The ratchet 31, the ratchet spring 32, and the washer 33 are mounted on the paper feed shaft 21 as shown in Figures 7(a) and 7(b).

The motor gear 24, the idle gear 25, the drive pulley 19, the first intermittent gear 26, the second intermittent gear 27, and the paper feed gear 28 jointly constitute a gear assembly for allowing the carriage moving means and the print paper feed means to operate in coaction, that is, for reciprocally moving the carriage 5 and feeding the print paper a fixed distance in the direction of the arrow 36 (Figure 1), in response to one reciprocating movement of the carriage 5. When

the carriage 5 moves one way in its reciprocating movement, the drive pulley 19 makes about 7 revolutions, the first intermittent gear 26 about 2.6 revolutions, and the second intermittent gear 27 about 0;8 revolution. On intermittent movement between the second intermittent gear 27 and the paper feed gear 28, the paper feed gear 28 turns through 20° at the time of feeding the paper, and turns through about 40° at the time of detecting the reference position of the carriage 5, and will not turn otherwise. The ratchets 30, 31 and the manual knob 34 constitute a manual paper feed mechanism for manually feeding the print paper back in the direction of the arrow 37 in Figure 1.

Operation of the thermal printer thus constructed is as follows: The basic relationship between movement of the carriage 5 and paper feed operation will be described with reference to Figures 8(a) through 8(j). Figures 8(a), (c), (e), (g), and (i) show the manner of the meshing engagement between the motor gear 24, the idle gear 25, the drive pulley 19, the first intermittent gear 26, the second intermittent gear 27, and the paper feed gear 28. These gears constitute the gear assembly for operating the carriage moving means and the print paper feed means in coaction, and Figures 8(b), (d), (f), (h), and (j) are illustrative of positions of the carriage 5 corresponding respectively to the gear meshing relationships shown in Figures 8(a), (c), (e), (g), and (i). In Figures 8(b), (d), (f), (h), and (j), A indicates a reference position of the carriage 5, PF a paper feed area, B a print area, S1 a firstcharacter printing position or a print starting position, and 580 an 80th-character printing position or a print ending position.

When the power supply is awitched on while the manual knob 34 is out of engagement with the ratchet 31, the motor 23 is rotated to cause the motor gear 24 and the idle gear 25 to rotate the drive pulley 19 for pulling the wire 16 to move the carriage 5 to the lefthand end position shown in Figure 8(b), that is, the reference position A. At this time, the movable contact 29a contacts the fixed contact 29b to detect that the carriage 5 has reached the reference position A. In response to such detection, the motor 23 is reversed to rotate the motor gear 24, the idle gear 25, and the drive pulley 19 in an opposite direction, whereupon the carriage 5 is moved by the wire 16 past the paper feed area PF into the print area B, aa shown in Figure 8(d), in which the thermal head 4 prints desired characters on the print paper.

While the carriage 5 is moved from the lefthand end to righthand end of the paper feed area PF, the paper feed gear 28 turns through 20° to cause the ratchet 30 engaging a ratchet on the paper feed gear 28 and the ratchet 31 engaging the ratchet 30 to rotate the paper feed shaft 21 through 20°, thereby feeding the print paper sandwiched between the paper feed rollers 20 and the roller 20a a fixed distance in the direction of the arrow 36 in Figure 1. During printing operation, the paper feed gear 28 does not turn, and the print paper is held at rest.

When characters have been printed up to the position S80, the motor 23 ia reversed to rotate the motor gear 24, the idle gear 25, and the drive pulley 19 in an oppoaite direction, and the carriage 5 is then caused by the wire 16 to return as shown in Figure 8(f). At this time, the paper feed gear 28 does not turn, and the print paper is held at rest. When the carriage 5 moves past the position Sl into the paper feed area PF having reached the righthand end thereof as shown in Figure 8(h), the paper feed gear 28 is started to turn by the second intermittent gear 27.

When the carriage 5 reaches the lefthand end of the paper feed area PF, the motor 23 is reveraed, and the carriage 5 moves back again. The reference position A of the carriage 5 is detected once at the beginning of operation of the thermal printer, and thereafter, the carriage 5 is reciprocally moved between the positions Sl, S80 for intervals dependent on a number of characters to be printed. While the carriage 5 moves from the lefthand end to righthand end of the paper feed area PF, the paper feed gear 28 turns to feed the print paper the required distance.

The solenoid 15 is energized and deenergized upon movement of the carriage 5. When the solenoid 15 is de-energized, the actuator 15d thereof does not press the carriage guide plate 8, which is turned about the support 9 thereof in the direction of the arrow 40 (Figure 2(a)) under the force of thc springs 12, thus causing the carriage 5 and hence the thermal head 4 to turn in the direction of the arrow 40 in union with the carriage guide plate 8. When the carriage 5 is in a range, as shown in Figures 5(a) and 5(b), in which it does not engage the stopper 13, that is, when the carriage 5 is in the print area B, the thermal head 4 presses the print tape 6 from the tape cassette 7 against the print paper. When the solenoid 15 is energized, the actuator 15d is turned in the direction of the arrow 15c of Figure 3(b) to turn the carriage guide plate 8 in the direction of the arrow 41 (Figure 2(a)) against the force of the springs 12. The carriage 5 and the thermal head 4 are also turned with the carriage guide plate 8 so that the thermal head 4 disengages from the platen 1.

When the thermal head 4 is to print characters, that is, when the carriage 5 moves from the position of Figure 8(d) to the position of Figure 8(f), the aolenoid 15 remains de-energized. When the carriage 5 moves from the position of Figure 8(f) to the position of Figure 8(j), the solenoid 15 remains energized.

The stopper 13 is positioned in alignment

with one end of the platen 1, or the paper feed area PF. When the carriage 5 is positioned in the paper feed area PF, the carriage guide plate 8 and the thermal head 4 are prevented from turning due to engagement of the carriage 5 with the stopper 13 even if the solenoid 15 is de-energized. Therefore, the thermal head 4 is kept away from the platen 1.

During movement of the carriage 5, the carriage 5 is guided properly along the front surface of the platen 1 with the carriage guide shafts 10 of the carriage 5 being guided in and along the groove 11 defined in the carriage guide plate 8 as shown in Figure 2(a).

When the gear 39f of the print tape takeup device 39 remains out of engagement with the rack 38 on the platen 1, as shown in Figure 4(a), such as while the carriage 5 is moving on its return stroke, the gears 39f, 39c, 39b do not rotate, and hence the print tape 6 in the tape cassette 7 is not wound. When the gear 39f and the rack 38 are in engagement, that is, during printing operation, the gear 39f is rotated in response to movement of the carriage 5, and the gears 39c, 39b are rotated in response to rotation of the gear 39f to wind the print tape 6 in the tape cassette 7 for allowing desired transfer of the thermally fusible material from the print tape to the print paper. During engagement of the gear 39f and the rack 38, their teeth will not hit each other to lock the gear 39f and the rack 38 since the ahaft 39e of the gear 39f is movable in the slot 39d and the gear 39f is biased toward the rack 38 by the spring 39i. Accordingly, the gear 39f and the rack 38 engage smoothly with each other.

When the motor 23 ia driven to rotate in one direction or the other, the paper feed shaft 21 rotates about its own axis in one direction only through the ratchets 30, 31, and hence the print paper is fed along only in the direction of the arrow 36 in Figure 1 regardless of the direction of rotation of the motor 23. However, the print paper can be fed back manually by bringing the gear on the manual knob 34 into engagement with the gear on the ratchet 31. More specifically, when the gear on the manual knob 34 is not in engagement with the gear on the ratchet 31 as shown in Figure 7(a), the ratchet 31 is in engagement with the ratchet 30 under the force of the ratchet spring 32, enabling the motor 23 to feed the print paper in one direction. When the manual knob 34 is depressed as shown in Figure 7(b), the tapered portion 34a of the manual knob 34 engages the tapered portion 31a of the ratchet 31, moving the ratchet 31 in the direction of the arrow 42 in Figure 7(b) against the force of the ratchet spring 32 under the force with which the manual knob 34 is depressed. The ratchet 31 is now disengaged from the ratchet 30, and the gear on the manual knob 34 is brought into engagement with the gear on the ratchet 31. When the manual knob 34 is then rotated, the ratchet 31 rotates in unison the paper feed shaft 21, the paper feed rollers 20, the roller 20a, and the roller shaft 20b for thereby feeding the print paper.

With the above arrangement, movement of the carriage 5 and paper feed operation can be achieved by the single motor 23.

Furthermore, since the detector composed of the movable contact 29a and the fixed contact 29b is disposed in the gear assembly which is angularly movable, the reference position A of the carriage 5 can accurately be detected without suffering from influences due to thermal deformations of the carriage 5, thermal deformations of the wire 16, or errors produced at the time of manufacturing and assemblying the carriage 5, the wire 16, the pulleys 17, 18 and other parts.

With the solenoid 15 integrally mounted on the frame 14, the number of parts of the solenoid 15 is reduced, and the solenoid 15 can be manufactured less costly. In addition, the outer profile of the solenoid 15 can be held to a minimum, and the space in which the aolenoid 15 is positioned can be minimized.

Since the stopper 13 is positioned in alignment with the paper feed area PF, the carriage 5 will engage the stopper 13 when the carriage 5 confronta the stopper 13 to thereby keep the carriage 5 away from the platen 1 even if the solenoid 15 is de-energized. Accordingly, the print paper can be fed manually along without any damage thereto by the manual knob 34 at the time the carriage 5 is positioned in the paper feed area PF, even if the power supply is turned off..

The carriage guide mechanism is composed of the carriage guide plate 8, the carriage guide shafts 10 on the carriage 5, and the groove 11 in the carriage guide plate 8. Since the carriage guide plate 8, the carriage guide shafts 10, and the groove 11 can easily be fabricated, the cost required for manufacturing the carriage guide mechanism can be minimized.

The rack 38 and the gear 39f are allowed to engage each other through the alot 39d in the carriage 5 and the spring 39i. This permits the number of components of the print tape takeup device 39 to be minimized, and therefore, the print tape takeup device 39 can be manufactured at a minimum cost.

Because the ratchet 31 can be brought out of mesh with the ratchet 30 by the manual knob 34, manual paper feeding can reliably be effected.

The detent mechanism including the detent springs 35a ia disposed between the manual knob 34 and the lever 35, so that the operator can have an appropriate feel of rotation of the manual knob 34.

Although in the above embodiment the de-

tector for detecting the reference position A of the carriage 5 is composed of the movable contact 29a and the fixed contact 29b, the present invention is not limited to such an arrangement. As shown in Figures 9(a) and 9(b), a paper feed gear 28 may have a projection 43, and a frame 14 may have a locking member 44 with which the projection 43 can engage, so that the reference poaition of the carriage 5 can be detected upon a step-out of the motor 23. C in Figure 9(b) indicates a reference position of the carriage 5 in which the motor 23 suffers a step-out due to engagement of the projection 43 with the locking member 44. Such a detector for detecting the reference position of the carriage 5 due to a motor step-out does not require the detector or switch composed of the movable contact 29a and the fixed contact 29b, and is of a simple arrangement and can be manufactured inexpensively as the projection 43 and the locking member 44 may easily be provided.

The mechanism or stopper 13 for stopping pressing movement of the thermal head 4 is disposed in alignment with the paper feed area PF. However, the present invention is not limited to the illustrated stopper 13, but auch a mechanism may be arranged as shown in Figures 10(a) and 10(b). Figure 10(a) illustrates the position in which a thermal head 4 is pressed against a platen 1, and Figure 10(b) the position in which the thermal head 4 is prevented from pressing movement.

As shown in Figures 10(a) and 10(b), a heart cam 45 is fixed to a frame 14, and a retainer pin 46 engaging with the heart cam 45 is movably mounted on a carriage guide plate 8. When the solenoid 15 is energized once, the carriage guide 8 is turned as shown in Figure 10(b) to cause the retainer pin 46 to engage a lower portion of the heart cam 45 against the force of the springa 12, whereupon the thermal head 4 is kept spaced from the platen 1. After the retainer pin 46 has engaged the lower portion of the heart cam 45, the parts remain positioned as shown in Figure 10(b) even if the solenoid 15 is de-energized. When the solenoid 15 is energized in the position of Figure 10(b), the carriage guide plate 8 is slightly turned in the direction of the arrow 47. By de-energizing the solenoid 15, the carriage guide plate 8 is turned upwardly under the force from the springs 12 as shown in Figure 10(a). The retainer pin 46 then engages an upper portion of the heart cam 45, and the thermal head 4 is pressed against the platen 1.

With the mechanism thus constructed for stopping preaaing movement of the thermal head 4, the time required to energize the solenoid 15 may be of a period long enough to bring the retainer pin 46 to engage the heart cam 45. The prevention of the thermal head 4 from being pressed against the platen 1 as shown in Figure 10(b) can mechanically be achieved by the heart cam 46 and the retainer pin 45. Therefore, it is not necessary to energize the solenoid 15 while the carriage 5 is on ita return stroke, and the arrangement is economical in that the amount of consumed electric power can be minimized.

Even if the power supply is switched off when the parta are in the position of Figure 10(b), the thermal hcad 4 remains reliably spaced from the platen 1 as shown in Figure 10(b). This allows the manual knob 34 to feed the paper manually along when the power supply is turned off..

In the foregoing embodiments, the present invention is illustrated as being incorporated in a thermal printer in which the thermally fuaible material is transferred from the print tape 6 to the print paper by the thermal head 4. However, the present invention is not limited to the illustrated arrangement, but may be incorporated in a thermal printer of the type in which the print tape 6 and the tape cassette 7 are not used, and a special sheet of print paper is used which will be discolored by being heated.

With the thermal printer of the present invention thus constructed, the carriage moving means and the print paper feeding means can be driven by one motor, and hence the thermal printer can be manufactured less costly.

Although certain preferred embodiments have been shown and described, it should be understood that many changes and modifications may be made therein without departing from the scope of the appended claims.

CLAIMS

1. A thermal printer comprising:

(a) a carriage;

(b) a platen diaposed in confronting relation to said carriage for winding a sheet of print paper thereon;

(c) a thermal head mounted on said carriage for printing on said sheet of print paper against said platen;

(d) first means for moving said carriage along said platen;

(e) aecond means for feeding said sheet of print paper;

(f) a single motor; and

(g) a gear assembly driven by said single motor for operating said first and second means, said gear assembly having a detector for detecting a reference position of said carriage.

2. A thermal printer according to claim 1, wherein said single motor has an output shaft supporting a motor gear, said gear assembly comprising an idle gear meshing with aaid motor gear, a drive pulley having a first gear meshing with said idle gear and a second gear, a first intermittent gear meshing said second gear, a second intermittent gear meshing with said first intermittent gear, and a

paper feed gear meshing with said second intermittent gear, said first means for moving being operatively coupled with aaid drive pulley, said second means for feeding being operatively coupled with said paper feed gear, said first and second intermittent gears being arranged such that said paper feed gear will be rotated through an angular interval smaller than that of rotation of said drive pulley.

3. A thermal printer according to claim 2, wherein said first means for moving includes a wire connected to said carriage and trained around said drive pulley.

4. A thermal printer according to claim 2, wherein said second means for feeding includes a paper feed shaft operatively coupled with said paper feed gear, paper feed rollers mounted on said paper feed shaft, and a roller held against said paper feed rollers with the sheet of print paper aandwiched therebetween.

5. A thermal printer according to claim 4, including a manual paper feed mechanism comprising a manual knob angularly movably supported on said platen and having a gear on an outer periphery thereof and a first tapered portion, a first ratchet engaging said paper feed gear, a second ratchet mounted on said paper feed ahaft and axially movable into and out of mesh with said first ratchet, said second ratchet being radially aligned with said gear on said manual knob and having a second tapered portion engageable with said first tapered portion, and a spring acting between said paper feed shaft and said second ratchet for normally urging said second ratchet in a direction to mesh with said first ratchet, said first and second tapered portions being radially aligned with each other so that when said manual knob is angularly moved into mesh with aaid second ratchet, said second ratchet is axially displaced out of mesh with said first ratchet against the resiliency of said spring due to engagement between said first and second tapered portions, whereby said paper feed shaft can be turned about its own axia in response to rotation of said manual knob.

6. A thermal printer according to claim 1, wherein said platen has a surface disposed in facing relation to said thermal head, said surface being divided into a paper feed area and a print area, further including a stopper mounted on said platen in alignment with said paper fecd area for preventing said thermal head from moving toward said platen.

7. A thermal printer according to claim 1, including a carriage guide plate on which said carriage is movably mounted, said carriage being angularly movable about an axis parallel to said platen, and at least one spring connected to said carriage guide plate for normally biasing said carriage guide plate in a direction toward said platen.

8. A thermal printer according to claim 7, further including a frame on which said platen is mounted, and a solenoid mounted on said frame and energizable for turning said carriage guide plate in a direction away from said platen.

9. A thermal printer according to claim 1, wherein said platen haa a rack extending therealong, further including a tape cassette detachably mounted on said carriage and accommodating a print tape, and a print tape takeup device mounted on said carriage below said tape cassette and comprising a gear movably mounted on said carriage and operatively coupled with a tape takeup spool in said tape cassette and a spring acting between said carriage and said gear for normally biasing said gear in a direction to mesh with said rack.

10. A thermal printer substantially as hereinbefore described with reference to the accompanying drawings.

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